

Electric Sail Propulsion Test and Validation

Completed Technology Project (2015 - 2016)



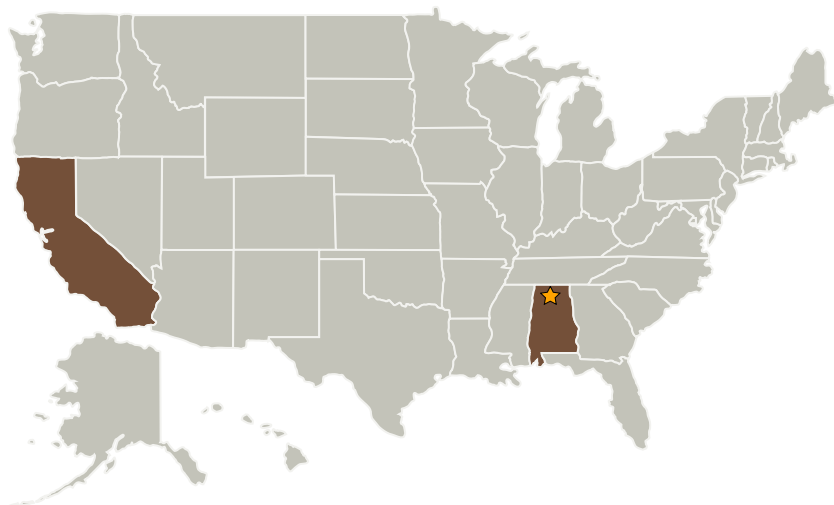
Project Introduction

In order to determine the true capability of the E-Sail, the discrepancy in force per unit length of charged wires must be understood. This difference can only be resolved by plasma chamber testing. Therefore, the first objective of this CIF project will be to repeat the MSFC interaction experiment, but with a long thin cylindrical test body, which will be more representative of the biased E-Sail wires. This proposed effort will also validate the physics model that describes the theory that a positively charged wire can produce a useful amount of thrust from solar wind. A strand of conductive wire will be charged and subjected to a solar wind environment in the MSFC Solar Wind Test Facility. Data collected will be compared with theoretical models.

Anticipated Benefits

Enable continued development of the electric sail concept by developing and experimentally validating more accurate physics models for sail performance. Electric sails can potentially enable ambitious new robotic science and exploration missions throughout the solar system and beyond.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama



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Co-Funding Partners	Type	Location
Finnish Meteorological Institute	Academia	Helsinki, Outside the United States, Finland

Primary U.S. Work Locations	
Alabama	California

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Center Innovation Fund: MSFC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

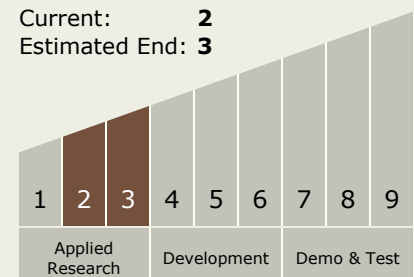
John W Dankanich

Principal Investigator:

Jared A Dervan

Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 3



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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.4 Advanced Propulsion
 - └ TX01.4.1 Solar Sails